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ABSTRACT

This report presents results of the 1988 assessment of almost 3,100 high school seniors identified as vocational completers from 34 pilot sites participating in the Southern Regional Education Board (SREB)-State Vocational Education Consortium. The assessment used a portion of the National Assessment of Educational Progress. The report first considers the setting of achievement goals for vocational students and then presents the results of the assessment. Student achievement is discussed: by type of curriculum; for black students and white students; for females and males; and by type of vocational program. This section concludes by presenting findings regarding student achievement based on the high school experiences of SREB pilot site vocational completers. Factors considered include: emphasis on basic skills by vocational teachers; English, mathematics, and science courses taken by vocational students; student attendance; student expectations and attitudes; assistance in planning a four-year program of study; and future plans of the vocational completers. The final section of the report offers recommendations specific to the improvement of reading, mathematics, and science achievement as well as a discussion of the importance of developing a program of vocational and academic study. The report contains 17 tables and figures and a list of pilot sites. (YLB)

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Linking Vocational and Academic Education

SREB-State Vocational Education Consortium

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ASSESSING THE READING, MATHEMATICS, AND SCIENCE ACHIEVEMENT OF 1988 SECONDARY VOCATIONAL COMPLETERS

A Report of the
1988 Baseline Assessment of the
SREB-State Vocational Education Consortium
Using the National Assessment of Educational Progress

Gene Bottoms and
Stephanie A. Korcheck

Southern Regional Education Board
592 Tenth Street, N.W. • Atlanta, Georgia 30318-5790 • 1989 • $7.50

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HIGHLIGHTS OF MAJOR FINDINGS

Reading, Mathematics, and Science Achievement of
1988 Vocational Completers at
SREB-State Vocational Education Consortium Pilot Sites
as Measured by the National Assessment of Educational Progress

Almost 3,100 high school seniors identified as vocational completers from 34 pilot sites participating in the SREB-State Vocational Education Consortium were assessed in reading, mathematics, and science using the National Assessment of Educational Progress (NAEP) in April and May of 1988. The following are highlights from the results of the SREB Consortium assessment. Unless otherwise indicated, *national comparisons are made to 17-year-old public high school students* from the most recent NAEP data available, a national sample of students assessed in the spring of 1986.

- Reading and mathematics achievement for SREB site vocational completers were significantly above the national average for students nationwide who indicated they were vocational students; science achievement was at the national average. (Figures 1-3, pages 6-7)

- When compared to students from public *and private* high schools nationwide who indicated they were in the general curriculum, SREB site vocational completers scored significantly above the national average in mathematics, at the national average in reading, and significantly below the national average in science. (Figures 1-3, pages 6-7)

- When compared to *all* black students in the nation, the reading and mathematics achievement of black vocational completers at the SREB sites were significantly above the national average; science achievement was at the national average for *all* black students. In each of the three subject areas assessed, the scores of white vocational completers at the SREB sites were significantly below the scores of *all* white students in the nation. (Table 2, page 8)

- Consistent with the NAEP national data, white vocational completers at the SREB sites scored significantly higher in all three subject areas than did black students; however, the gaps between the scores of black and white vocational completers at the SREB pilot sites are about half that of the gap between the scores of *all* black students and *all* white students in the nation. (Table 2, page 8)

- The average achievement of female SREB site vocational completers was significantly above that of male SREB site vocational completers in each of the subject areas assessed. (Table 3, page 9)

- When SREB site vocational completers indicated that their vocational teachers often stressed the importance of reading and mathematics skills (46 percent and 56 percent, respectively), their achievement in reading and mathematics was significantly above that of completers who indicated that their vocational teachers never stressed the importance of these skills. (Table 5, page 13)

- Fewer than half of the SREB site vocational completers chose their mathematics and science courses from the college preparatory curriculum -- 44 percent and 35 percent reported completing geometry and algebra II, respectively; 27 percent and 11 percent indicated they had taken chemistry and physics. (Figures 7-8, pages 16-17)

- The average mathematics achievement score of SREB site vocational completers consistently increased as they reported having taken progressively higher levels of mathematics courses, from general mathematics through calculus. (Figure 9, page 18)

- When responding to questions about their high school experience, 26 percent of the SREB site vocational completers reported that they were not assigned homework each day, 55 percent said they were not encouraged to take more mathematics and science courses, and 13 percent indicated that most teachers did not expect them to do well in school. (Appendix B, Table 13)

- When asked what one thing they would do differently if they could repeat high school, 45 percent of the SREB site vocational completers indicated they would study more and a total of 35 percent reported they would choose higher-level mathematics and science courses to compliment their vocational studies and better prepare them for college. Over 20 percent of the SREB completers indicated that they would not do anything differently. (Appendix B, Table 14)

- When asked to indicate what they planned to do after high school, 47 percent of the SREB site vocational completers reported that they would pursue further education -- 28 percent of those would take academic coursework at a two- or four-year college -- 38 percent said they planned to work on a full-time basis, and 8 percent planned to enter the military. (Table 8, page 24)

THE SREB-STATE VOCATIONAL EDUCATION CONSORTIUM

Dedicated to Strengthening the Basic Competencies of
Students Enrolled in Vocational Education Programs

Alabama, Arkansas, Florida, Georgia, Kentucky,
Louisiana, Maryland, Mississippi, North Carolina,
Oklahoma, South Carolina, Tennessee,
Virginia, and West Virginia

in collaboration with

Southern Regional Education Board
and
The National Center for Research
in Vocational Education

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Elwyn Wheat, *Associate State Superintendent, Vocational-Technical Education*, Mississippi Department of Education

TABLE OF CONTENTS

List of Figures and Tables vi

Foreword viii

Interpreting the Data x

Setting Achievement Goals for Vocational Students 1

Reading, Mathematics, and Science Achievement of 1988 SREB Pilot Site Vocational Completers 5

- Student Achievement by Type of Curriculum
- Student Achievement for Black Students and White Students
- Student Achievement for Females and Males
- Student Achievement by Type of Vocational Program
- Student Achievement Based on the High School Experiences of SREB Pilot Site Vocational Completers
  - Emphasis of Basic Skills by Vocational Teachers
  - English, Mathematics, and Science Courses Taken by Vocational Students
  - Student Attendance
  - Student Expectations and Attitudes
  - Assistance in Planning a Four-Year Program of Study
  - Future Plans of SREB Pilot Site Vocational Completers

Strategies to Improve the Reading, Mathematics, and Science Achievement of SREB Pilot Site Vocational Completers 25

- Strategies for Improving Reading Achievement
- Strategies for Improving Mathematics Achievement
- Strategies for Improving Science Achievement
- Developing a Vocational and Academic Program of Study to Improve Course Selection and Planning

Appendices

- Appendix A 33
  SREB-State Vocational Education Consortium Pilot Sites
- Appendix B (available upon request)
  Additional Data from the Assessment of 1988 SREB Pilot Site Vocational Completers Using the National Assessment of Educational Progress

LIST OF TABLES AND FIGURES
(in order of appearance)

Table 1	Student Achievement Goals for 1993 SREB Pilot Site Vocational Completers as Measured by the National Assessment of Educational Progress	3
Figure 1	Average Reading Scores by Type of High School Curriculum, *as Reported by Students*	6
Figure 2	Average Mathematics Scores by Type of High School Curriculum, *as Reported by Students*	7
Figure 3	Average Science Scores by Type of High School Curriculum, *as Reported by Students*	7
Table 2	Average Reading, Mathematics, and Science Scores, and Differences in Scores, by Race, SREB Vocational Completers and the Nation	8
Table 3	Average Reading, Mathematics, and Science Scores by Gender, SREB Vocational Completers and the Nation	9
Table 4	Enrollment by Type of Vocational Program, *as Reported by Students*, SREB Vocational Completers	10
Figure 4	Average Reading Scores by Type of Vocational Program, *as Reported by Students*, SREB Vocational Completers	11
Figure 5	Average Mathematics Scores by Type of Vocational Program, *as Reported by Students*, SREB Vocational Completers	12
Figure 6	Average Science Scores by Type of Vocational Program, *as Reported by Students*, SREB Vocational Completers	12
Table 5	Extent to Which Vocational Teachers Stressed the Importance of Reading, Mathematics, and Science Skills, *as Reported by Students*, and Corresponding Average Scores, SREB Vocational Completers	13
Table 6	Number of Mathematics and Science Units Taken in Grades 9-12, *as Reported by Students*, SREB Vocational Completers	15
Figure 7	Enrollment in Specific Mathematics Courses, *as Reported by Students*, SREB Vocational Completers, National Vocational Students, and National Academic Students	16

Figure 8	Enrollment in Specific Science Courses, *as Reported by Students*, SREB Vocational Completers, National Vocational Students, and National Academic Students	17
Figure 9	Average Mathematics Scores of Students Who Have Completed Specific Mathematics Courses, SREB Vocational Completers	18
Table 7	Amount of Time Spent on Homework Each Day, *as Reported by Students*, and Corresponding Average Scores, SREB Vocational Completers	21
Table 8	What Will Take the Largest Amount of Students' Time After High School, and Corresponding Average Scores, SREB Vocational Completers	24

FOREWORD

Vocational education can make a vital contribution to an upgraded secondary school curriculum if it is improved and refocused so that the development of basic academic skills is a high priority.

"10 Recommendations for Improving
Secondary Vocational Education"
Southern Regional Education Board, 1985

Vocational education programs that place a high priority on developing basic academic skills can help produce graduates with the necessary skills for further learning -- on the job or in formal education.

Goals for Education
CHALLENGE 2000
Southern Regional Education Board, 1988

In 1987, 13 member states of the Southern Regional Education Board (SREB) formed the SREB-State Vocational Education Consortium to develop, apply, evaluate, and advance approaches designed to strengthen the basic competencies -- communications, mathematics, science, critical thinking, and problem-solving -- of students enrolled in vocational education programs. Over 30 pilot sites in these 13 states, working with state vocational and non-vocational leaders, are developing and implementing strategies to strengthen their vocational, communications, mathematics, and science curricula. Periodically, staff development conferences are held as a forum for pilot site and state staff to exchange ideas and consider new initiatives. Recently, Louisiana became the 14th state to join the Consortium; four pilot sites are in the early stages of developing initiatives for the 1989-90 school year.

The strategies being implemented to improve the basic competencies of students pursuing vocational studies reflect a dual purpose of preparing students for employment and providing them the knowledge needed to continue to learn either on the job or at a postsecondary institution. Some of the specific approaches include requiring students to complete a more rigorous and coherent program of vocational and academic study; increasing the amount of time vocational teachers spend explicitly reinforcing higher-level basic competencies; expanding the use of applied, "real-world" instructional approaches in academic courses; designing courses that focus on developing specific academic skills; and providing individualized counseling to assist students in the selection of courses. The intent is to increase the academic content of the vocational curriculum and the vocational content of the academic curriculum so that the full potential of students can be realized.

An integral part of the six-year Consortium initiative is evaluating the progress of pilot sites in achieving the Consortium goals. A variety of measures are being used, including the assessment of student achievement in reading, mathematics, and science; annual studies of the transcripts of students who complete vocational programs to determine the number and types of courses taken; annual follow-up surveys to determine what career and educational decisions these students make after high school; and surveys of pilot site personnel.

To assess student achievement, the Consortium is using a portion of the National Assessment of Educational Progress (NAEP) to gauge the achievement levels of students in these model programs and to compare their performance to that of students nationwide. The results presented in this report are from the 1988 assessment of almost 3,100 graduates of vocational programs in 34 Consortium pilot sites. This baseline of data provides a measure against which 1990 and 1993 SREB vocational graduates will be compared. Data from the National Assessment are reported for groups of students and are not designed for the evaluation of individual student performance.

The pilot sites and states involved in the initiatives of the SREB-State Vocational Education Consortium are seeking to implement a variety of strategies designed to improve the high school experiences of the large number of students who are not enrolled in the college preparatory curriculum. A comprehensive evaluation process -- which includes the assessment of student achievement -- will provide tangible results of the effectiveness of specific strategies and serve to encourage other schools and states to duplicate those initiatives that appear to offer the most promise in improving the preparation of students who complete a vocational program.

Mark D. Musick, President
Southern Regional Education Board

INTERPRETING THE DATA

In the spring of 1988, almost 3,100 seniors identified as vocational completers were assessed in the areas of reading, mathematics, and science using a portion of the National Assessment of Educational Progress (NAEP). The students were from 34 pilot sites in 13 of the 14 states that are members of the SREB-State Vocational Education Consortium (pilot sites in the newest state to join this effort had not been selected at the time of the assessment). It is important to note that at the time of this assessment, not all of the pilot sites had begun actually to implement their strategies for improving the educational experiences of vocational completers.

Pilot site staff were instructed to identify the seniors in their school who had completed four or more Carnegie units in a vocational concentration. If any of those identified students met one or more of the following criteria, they were exempted from taking the NAEP: (a) unable to read English; (b) unable to take the test due to a severe physical disability; (c) classified by psychological testing as educable mentally retarded (EMR); or (d) has an individualized educational plan (IEP) that recommends that the student not be tested.

The reading, mathematics, and science achievement results presented for SREB site vocational completers should not be interpreted as being representative of all vocational completers in the entire SREB region. No attempt was made to select a representative sample of high schools or students for the region. Rather, schools participating in the Consortium were selected on a competitive basis because school officials demonstrated a willingness to pursue initiatives for improving the basic competencies of students taking vocational courses.

The national data presented in this report are drawn from the most current available data, the 1986 testing of a national sample of 17-year-old public and private high school students using the National Assessment of Educational Progress. NAEP was created by Congress in 1969 and is currently administered by the Educational Testing Service under a grant from the U.S. Department of Education. The national sample of students participating in the National Assessment (approximately 15,000 in reading and 10,000 in mathematics and science) were carefully selected to mirror as closely as possible the general population of 17-year-old students. Some of the factors considered in the selection of the national sample included racial background, socioeconomic status, and geographic location.

For the purposes of the comparisons in this report, unless otherwise indicated, *national data represent only the scores of 17-year-old public high school students in the national sample.* The achievement scores are reported as scale scores (0-100 for reading; 0-500 for mathematics and science). The scales *are not* comparable across subject areas; i.e., the level of skills needed to achieve a scale score of 275 on the mathematics assessment is not comparable to the level of skills needed to score 275 on the science assessment.

The following terms appear repeatedly in the text, figures, and tables contained in this report and are defined as follows:

- SREB/Vocational -- Those seniors (approximately 3,100 in number) at 34 pilot sites participating in the SREB-State Vocational Education Consortium identified by pilot site staff as having completed at least four Carnegie units in a vocational concentration and who were tested with the National Assessment of Educational Progress in the spring of 1988.

- Nation/Total -- All 17-year-old public high school students in the 1986 NAEP national sample.

- Nation/Academic -- Those 17-year-old public high school students in the 1986 NAEP national sample indicating that they were in the college preparatory curriculum.

- Nation/General -- Those 17-year-old public *and private* high school students in the 1986 NAEP national sample indicating that they were in the general curriculum.

- Nation/Vocational -- Those 17-year-old public high school students in the 1986 NAEP national sample indicating that they were in the vocational curriculum.

SETTING ACHIEVEMENT GOALS FOR VOCATIONAL STUDENTS

Persons who lack basic academic competencies will remain in dead-end jobs, and will be unable to adjust to the shifting job market in a rapidly changing economy.

"10 Recommendations for Improving
Secondary Vocational Education"
Southern Regional Education Board, 1985

Indicators of progress in improving the basic competencies of students who complete secondary vocational education programs include: raising the basic reading, mathematics, and science competencies...to national averages or higher as measured by programs such as the National Assessment of Educational Progress.

Goals for Education
CHALLENGE 2000
Southern Regional Education Board, 1988

Consider the following scenario that is projected for the year 2000: Of the 10 million new jobs that will have been created in the SREB states, over 80 percent will require at least high school education, and many will require some type of postsecondary education. Also consider that even if each of the SREB states successfully reduces the number of dropouts by one-half, the number of students dropping out of school and the number of adults who do not possess a high school diploma or its equivalent will total over 10 million adults in the SREB region -- the same as the number of projected new jobs.

How can these two issues -- the increasingly higher levels of skills required by the workplace and the large numbers of students leaving high school before graduation -- be effectively addressed? The 14 member states of the SREB-State Vocational Education Consortium share the belief that these issues can be addressed by developing strategies that will translate into providing a more challenging vocational and academic curriculum for the vast numbers of high school students now enrolled in the general curriculum. Such a curriculum could maintain or, in some cases, rekindle students' interest in learning; motivate them to graduate from high

school; and provide them with the levels of knowledge in basic academic competencies and technical skills that will enable them to continue to learn either on the job or in a postsecondary institution.

The Consortium was formed in 1987 and over 30 pilot sites in 14 states are currently developing and implementing specific strategies to improve the basic competencies -- communications, mathematics, science, critical thinking, and problem-solving -- of students enrolled in vocational education. Members of the Consortium are taking steps to ensure that students designated as "vocational completers" will not only have completed four Carnegie units in a single vocational concentration -- the number of units, according to national studies, that lead to better employment opportunities, higher earnings, and mastery of more complex skills -- but vocational completers from the Consortium pilot sites will also have completed a rigorous, coherent program of vocational and academic courses. Such preparation will provide vocational completers with the levels of skills and knowledge necessary for success in today's ever-changing workplace.

As part of a comprehensive process designed to evaluate the effectiveness of the various strategies being implemented over the course of the six-year Consortium effort, almost 3,100 1988 vocational completers from 34 pilot sites in 13 states were assessed in reading, mathematics, and science using a portion of the National Assessment of Educational Progress (NAEP). (The Consortium pilot sites are listed by state in Appendix A.) Results from this assessment provide a baseline of achievement data against which 1990 and 1993 vocational completers at the pilot sites will be compared.

Over the next five years, the Consortium will work to close by one-third the gap in reading, mathematics, and science achievement -- as measured by NAEP in 1993 -- between SREB site vocational completers and students nationwide who report that they are enrolled in the academic college preparatory curriculum (Table 1). Such a margin of increase would indicate that statistically significant improvements in student achievement have occurred. Using the scores of 1986 academic students nationwide as the standard will provide a realistic, stable target for the Consortium pilot sites as they seek ways to improve upon the strategies already in place.

TABLE 1

Student Achievement Goals for
1993 SREB Pilot Site Vocational Completers
as Measured by the
National Assessment of Educational Progress

	Reading	Mathematics	Science
SREB/Vocational, 1988	53.7	293.3	267.7
Nation/Academic, 1986	59.1	317.3	306.7
1993 GOAL* -- SREB/VOCATIONAL	55.5	301.0	280.7

*The 1993 goal for SREB pilot site vocational completers represents closing by one-third the gap between their scores and the scores of 1986 students nationwide who indicated they were in the academic curriculum.

In several cases, a pilot site may have already attained scores at or above the 1993 Consortium goals -- 7 of the 34 sites have met the goal in reading, 4 have reached the goal in mathematics, and 4 have met the goal in science; 2 of the pilot sites have reached the Consortium goal in all three subject areas. In these cases, the pilot sites will be expected to set even higher goals; for example, closing the gap between *their school's* vocational completers and 1986 academic students nationwide by one-third.

Members of the Consortium firmly believe that their efforts will be successful only when vocational completers are expected to achieve and perform at levels commensurate with that of students nationwide. Using the respected National Assessment of Educational Progress to assess the achievement of vocational completers at the pilot sites will allow the Consortium to evaluate the effectiveness of its initiatives compared to current and truly national standards of student achievement. Such comparisons will validate approaches that are successful in raising the basic competencies of vocational students and provide evidence for other schools and states to duplicate these successful programs.

READING, MATHEMATICS, AND SCIENCE ACHIEVEMENT OF 1988 SREB PILOT SITE VOCATIONAL COMPLETERS

Results from the 1988 SREB-State Vocational Education Consortium assessment using the National Assessment of Educational Progress (NAEP) reveal that the reading and mathematics achievement scores of SREB pilot site vocational completers were significantly above the average scores of 1986 vocational students nationwide and science scores were at the national average for vocational students. Almost 3,100 1988 high school graduates identified as vocational completers at 34 SREB Consortium pilot sites were tested during April and May of 1988.

A comparison of selected socioeconomic variables between SREB site vocational completers and students in the 1986 NAEP national sample who indicated they were vocational students reveals that the percentages of students in these two groups differ in terms of race and language background, but are similar with respect to other selected variables (Appendix B, Table 1*). About 20 percent of the SREB site vocational completers indicated that they are minorities as compared to 33 percent of vocational students nationwide. Over 12 percent of the national vocational students were from homes where another language is spoken at least half of the time compared to 4 percent for SREB site vocational completers. However, with respect to the levels of parental educational and home support for education, SREB site vocational completers indicated responses that were, for the most part, very similar to national vocational students.

Student Achievement by Type of High School Curriculum

In the student survey portion of the NAEP, students are asked to indicate the type of curriculum they are pursuing -- academic/college preparatory, general, or vocational. It is important to note that the national data for 17-year-old public high school students is based solely on the responses of the students who took the test. In contrast, the seniors taking the NAEP at the SREB pilot sites were

*Available upon request for $3.00 from the SREB-State Vocational Education Consortium. Appendix B contains the 18 tables that are cited in the discussion of the NAEP results.

selected by school staff as being vocational completers based on the criteria that they had completed at least four Carnegie units in a vocational concentration.

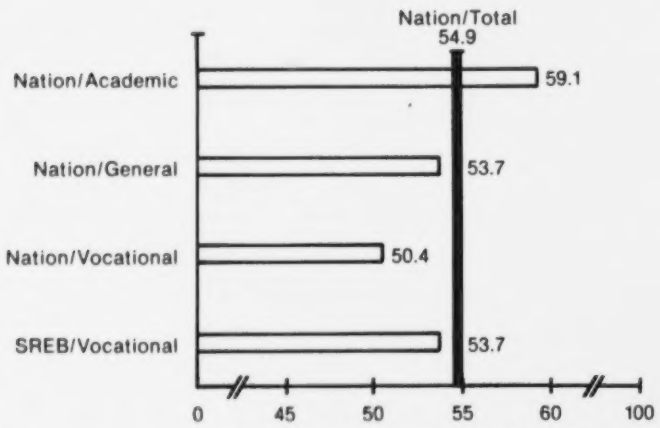
The reading and mathematics achievement scores of SREB site vocational completers -- 53.7 and 293.3, respectively -- were significantly above the national averages -- 50.4 and 282.3, respectively -- for students nationwide who indicated they were enrolled in the vocational curriculum. In science, SREB site vocational completers scored 267.7, which is at the national average of 266.7 for vocational students (Figures 1-3; also Appendix B, Table 2).

In mathematics, SREB completers scored significantly above the national average for students indicating they were in the general curriculum; in reading, SREB completers were at the national average and in science, they were significantly below the national average for students in the general curriculum. SREB site vocational completers were significantly below the national average in each of the subject areas assessed when compared to the national average for students in the academic curriculum and the total national average for students in all three types of curricula.

FIGURE 1

Average Reading Scores by Type of High School Curriculum, as Reported by Students

NATIONAL ASSESSMENT OF EDUCATIONAL PROGRESS RESULTS FOR 1988 SREB PILOT SITE VOCATIONAL COMPLETERS

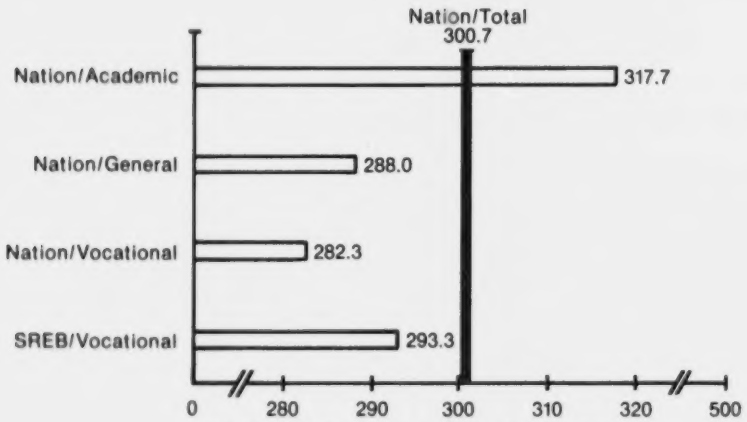


Note: Appendix B, Table 2 contains additional data.

FIGURE 2

Average Mathematics Scores by Type of High School Curriculum, as Reported by Students

NATIONAL ASSESSMENT OF EDUCATIONAL PROGRESS RESULTS FOR 1988 SREB PILOT SITE VOCATIONAL COMPLETERS

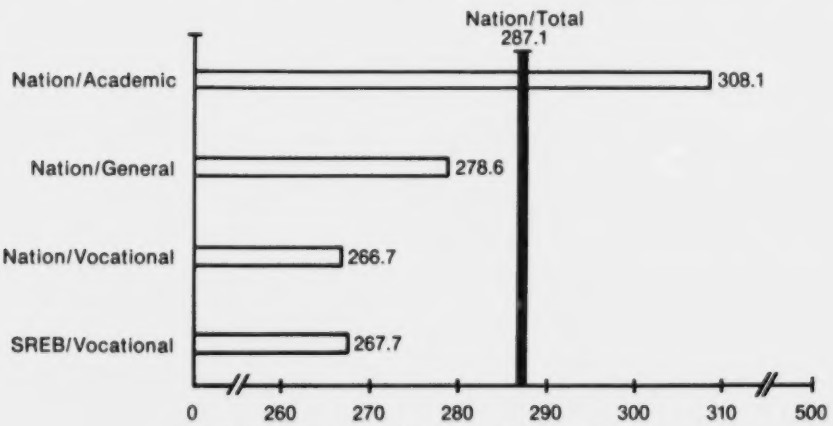


Note: Appendix B, Table 2 contains additional data.

FIGURE 3

Average Science Scores by Type of High School Curriculum, as Reported by Students

NATIONAL ASSESSMENT OF EDUCATIONAL PROGRESS RESULTS FOR 1988 SREB PILOT SITE VOCATIONAL COMPLETERS



Note: Appendix B, Table 2 contains additional data.

Student Achievement for Black Students and White Students

Black vocational completers at the SREB pilot sites scored significantly above the average for *all* black students nationwide in reading and mathematics and at the national average for *all* black students in science (Table 2). White vocational completers at the SREB pilot sites had average scores significantly below the average for *all* white students in the nation in each subject area assessed. Consistent with national data, white vocational completers at the SREB sites scored significantly higher than black completers in all three subject areas. However, the gaps between the scores of black and white vocational completers at the SREB pilot sites are about half that of the gaps between the scores of *all* black students and *all* white students in the nation.

TABLE 2

Average Reading, Mathematics, and Science Scores,
and Differences in Scores, by Race,
SREB Vocational Completers and the Nation

NATIONAL ASSESSMENT OF EDUCATIONAL PROGRESS RESULTS
FOR 1988 SREB PILOT SITE VOCATIONAL COMPLETERS

	Reading	Mathematics	Science
SREB/Vocational			
Black	51.6 (0.1)	278.4 (0.6)	245.2 (1.6)
White	54.1 (0.1)	296.3 (0.1)	272.5 (0.3)
Difference	2.5	17.9	27.3
Nation/Total			
Black	50.1 (0.3)	274.9 (1.0)	248.6 (1.4)
White	56.4 (0.2)	306.9 (0.7)	297.0 (0.8)
Difference	6.3	32.0	48.4

Note: Numbers in ( ) represent the standard error, a function of the size of the sample and the variability of scores within the sample. The range of scores obtained by adding and subtracting two standard errors to an average score -- referred to as the "confidence interval" -- allows one to be 95 percent sure that the score falls somewhere within that range. Therefore, if the confidence intervals of two average scores do not overlap, the scores are said to be statistically significantly different from one another.

Student Achievement for Females and Males

The achievement scores of female vocational completers from the SREB pilot sites were significantly above the average scores for their male counterparts in each subject area (Table 3). This contradicts data from almost every national testing program, where males consistently outscore females in mathematics and science. One reason for this contradiction may be the fact that students from the SREB sites taking the NAEP were identified *by school staff* as being vocational completers; national data for vocational students relies on students categorizing themselves as being in the vocational curriculum. For example, many female students pursuing both a college preparatory curriculum and a vocational concentration in business may not report themselves as being in the vocational curriculum.

TABLE 3

Average Reading, Mathematics, and Science Scores
by Gender,
SREB Vocational Completers and the Nation

NATIONAL ASSESSMENT OF EDUCATIONAL PROGRESS RESULTS
FOR 1988 SREB PILOT SITE VOCATIONAL COMPLETERS

	Reading	Mathematics	Science
SREB/Vocational			
Female	56.1 (0.1)	295.2 (0.2)	270.2 (0.4)
Male	51.3 (0.1)	291.5 (0.3)	265.5 (0.7)
Nation/Total			
Female	56.6 (0.2)	299.6 (0.6)	280.8 (0.9)
Male	53.3 (0.3)	301.7 (1.0)	293.3 (1.0)

Note: Numbers in ( ) represent the standard error, a function of the size of the sample and the variability of scores within the sample. The range of scores obtained by adding and subtracting two standard errors to an average score -- referred to as the "confidence interval" -- allows one to be 95 percent sure that the score falls somewhere within that range. Therefore, if the confidence intervals of two average scores do not overlap, the scores are said to be statistically significantly different from one another.

Student Achievement by Type of Vocational Program

Differences in reading, mathematics, and science achievement levels can be related to the type of vocational program students complete while in high school. It is important to note, however, that differences in achievement levels may be attributable in part to the achievement levels students already possess prior to enrolling in a vocational program.

According to responses to questions on the student survey portion of the NAEP, almost one-third of the SREB site vocational completers were enrolled in the area of business/office. Trade/industrial occupations accounted for nearly one-fourth of the enrollment, while enrollment in the technical areas reached almost one-fifth of the total enrollment (Table 4).

TABLE 4

Enrollment by Type of Vocational Program,
as Reported by Students,
SREB Vocational Completers

NATIONAL ASSESSMENT OF EDUCATIONAL PROGRESS RESULTS
FOR 1988 SREB PILOT SITE VOCATIONAL COMPLETERS

	Percent of SREB/Vocational
Agriculture	7%
Business/Office	31
Consumer/Homemaking Education	2
Health Occupations	6
Home Economics Occupations	5
Marketing	7
Technical	10
Technical Education/ Industrial Arts	6
Trade/Industrial Occupations	23

Notes: Percentages have been rounded.

Percentages do not add to 100 because some students did not indicate the type of vocational program they were pursuing.

Generally, SREB site vocational completers enrolled in business/office, marketing, and technical programs had the highest average scores; completers in agriculture and home economics scored the lowest (Figures 4-6). SREB site agriculture completers had the lowest average reading score (49.4), while business completers had the highest (56.7). In mathematics, consumer/homemaking completers had the lowest average mathematics score (272.8); technical and marketing completers had the highest average score (302.2 and 301.6). In science achievement, home economics completers had the lowest average score (250.8), while technical completers had the highest (284.1).

FIGURE 4

Average Reading Scores by Type of Vocational Program, as Reported by Students, SREB Vocational Completers

NATIONAL ASSESSMENT OF EDUCATIONAL PROGRESS RESULTS FOR 1988 SREB PILOT SITE VOCATIONAL COMPLETERS

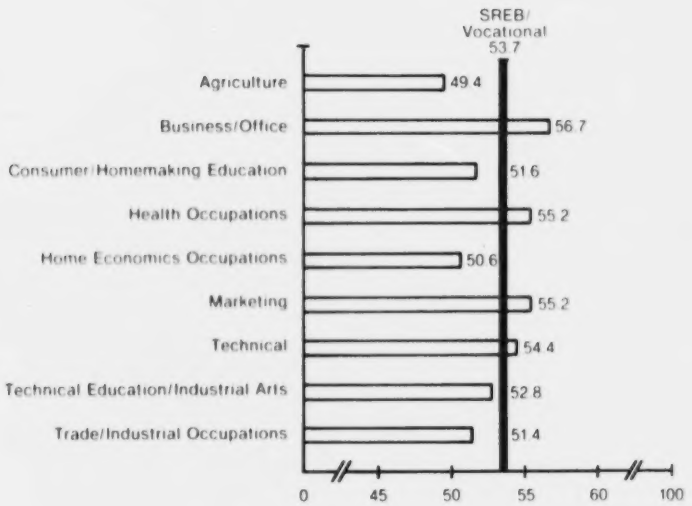


FIGURE 5

Average Mathematics Scores by Type of Vocational Program, as Reported by Students

SREB Vocational Completers

NATIONAL ASSESSMENT OF EDUCATIONAL PROGRESS RESULTS FOR 1988 SREB PILOT SITE VOCATIONAL COMPLETERS

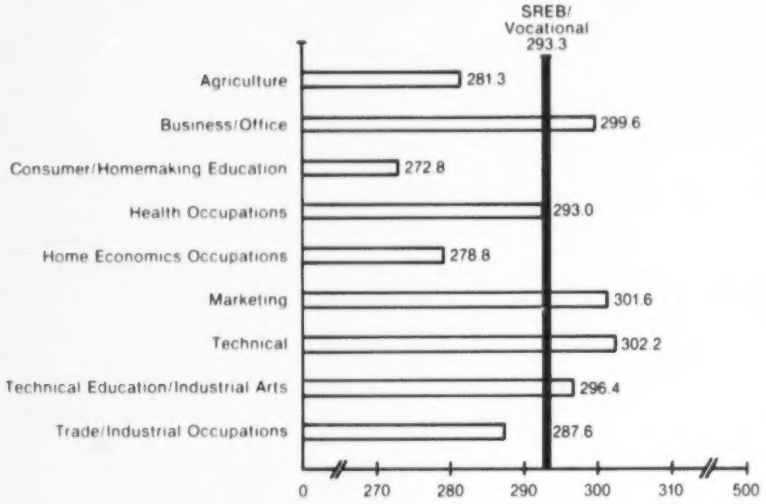
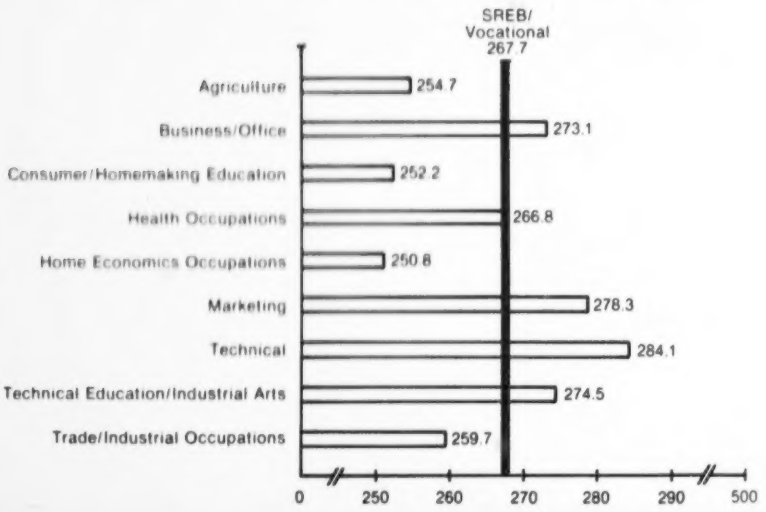


FIGURE 6

Average Science Scores by Type of Vocational Program, as Reported by Students,

SREB Vocational Completers

NATIONAL ASSESSMENT OF EDUCATIONAL PROGRESS RESULTS FOR 1988 SREB PILOT SITE VOCATIONAL COMPLETERS



Student Achievement Based on the High School Experiences of SREB Pilot Site Vocational Completers

As a part of the National Assessment of Educational Progress, about half of the 224 questions pertained to students' background, high school courses and experiences, and plans for the future. Responses to these questions were self-reported and should be considered with other information in attempting to draw conclusions.

Emphasis of Basic Skills by Vocational Teachers

SREB site vocational completers who reported that their vocational teachers often stressed reading, mathematics, and science skills had significantly higher average scores in all three subject areas assessed by the NAEP than those students who reported no such emphasis by their vocational teachers. Almost half of the SREB completers reported that their vocational teachers often stressed reading skills, over half indicated that vocational teachers often stressed mathematics skills, and about one-fourth responded that vocational teachers often stressed science skills (Table 5).

TABLE 5

Extent to Which Vocational Teachers Stressed the Importance of Reading, Mathematics, and Science Skills, as Reported by Students, and Corresponding Average Scores, SREB Vocational Completers

NATIONAL ASSESSMENT OF EDUCATIONAL PROGRESS RESULTS FOR 1988 SREB PILOT SITE VOCATIONAL COMPLETERS

	Reading		Mathematics		Science	
	Percent of SREB/Vocational	Score	Percent of SREB/Vocational	Score	Percent of SREB/Vocational	Score
Often Stressed	46%	54.8	56%	296.1	27%	270.9
Never Stressed/ Could Not Recall Being Stressed*	24%	51.7	17%	287.1	42%	264.6

*Represents data that has been collapsed from two of the four possible responses. The percentages were combined and a weighted average score was calculated.

Notes: Percentages have been rounded.

Percentages do not add to 100 because one other response was available. Appendix B, Table 3 contains a complete listing of data for each of the four possible responses.

The average reading achievement score for SREB completers who reported that their vocational teachers often stressed reading skills was three points higher than for those whose vocational teachers did not often stress these skills. Over half of the SREB site vocational completers enrolled in business/office, health occupations, and home economics occupations reported that their vocational teachers often stressed the importance of reading skills; for all vocational programs, percentages ranged from 37 percent in agriculture to 56 percent in business/office (Appendix B, Table 4).

The difference in the average mathematics scores of students whose vocational teachers did and did not stress mathematics skills was nine points, about the same as the difference between students who do and do not choose to take an additional mathematics course (this will be discussed in more detail in the next section). About two-thirds of the marketing and technical/trade/industrial completers indicated that their vocational teachers often stressed mathematics skills; percentages ranged from 41 percent in health occupations to 66 percent in technical programs.

Less than one-third of the SREB vocational completers reported that their vocational teachers stressed the importance of science skills and their average science scores were six points higher than the completers whose teachers provided no such emphasis. Almost 60 percent of SREB site vocational completers in the health occupations program reported that their vocational teachers often stressed science; percentages ranged from 16 in business/office to 58 percent in health occupations, the only vocational program where over 40 percent of the SREB completers indicated that their vocational teachers had stressed science skills.

English, Mathematics, and Science Courses Taken by Vocational Students

When asked to indicate the type of English course in which they were currently enrolled, over two-thirds of SREB site vocational completers responded that they were in a general English course (Appendix B, Table 5). In mathematics, about 45 percent of SREB site vocational completers reported having taken three units and

almost 30 percent indicated they had taken four units in mathematics in grades 9 through 12. Half of the SREB completers had taken two units in science, while one-third had taken three units (Table 6).

TABLE 6

Number of Mathematics and Science Units
Taken in Grades 9-12,
as Reported by Students,
SREB Vocational Completers

NATIONAL ASSESSMENT OF EDUCATIONAL PROGRESS RESULTS
FOR 1988 SREB PILOT SITE VOCATIONAL COMPLETERS

	Mathematics Units	Science Units
1 or less	1%	4%
2	25	50
3	45	34
4 or more	28	12

Note: Percentages have been rounded.

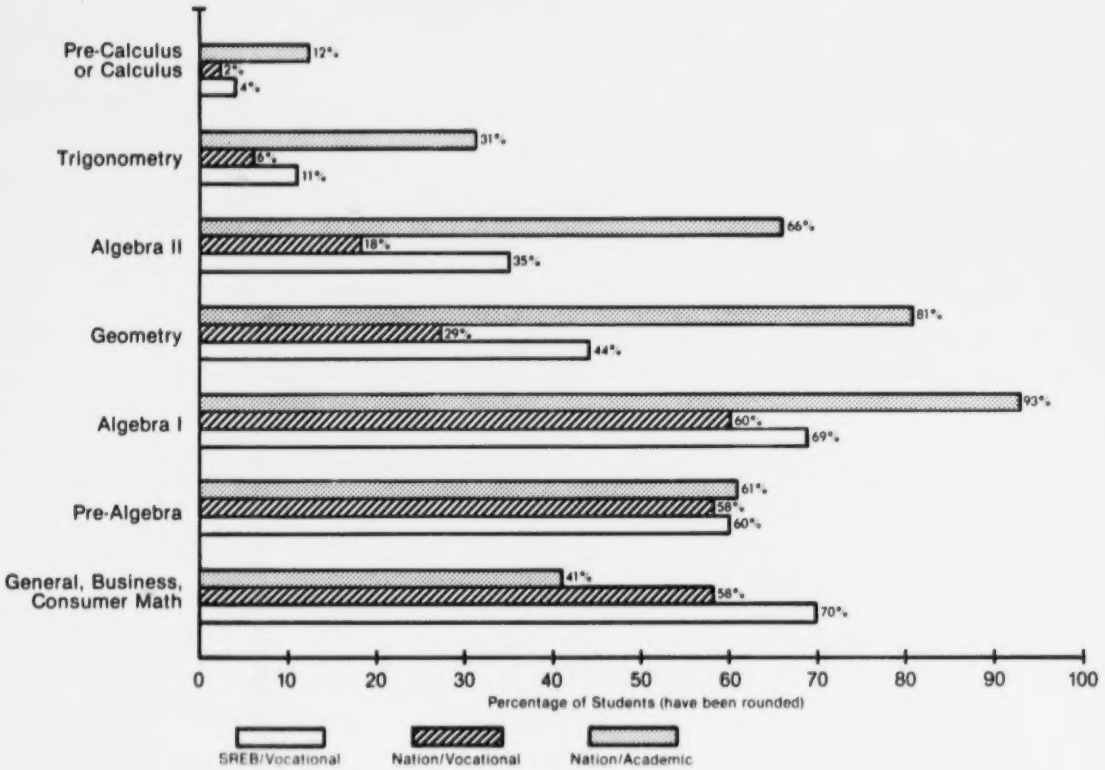
Consistently higher percentages of SREB site vocational completers took each level of mathematics courses than did national vocational students (Figure 7). Specifically, 69 percent of SREB site vocational completers reported taking algebra I, compared to 60 percent of vocational completers nationally; 44 percent and 35 percent of the SREB site vocational completers reported completing geometry and algebra II, respectively; for vocational students nationwide, 29 percent and 18 percent have taken these courses. When compared to *all* 17-year-old public students in the nation, more SREB completers took general mathematics and

pre-algebra, but fewer SREB site vocational completers took the higher levels of mathematics courses than did students nationally, from algebra I through calculus (Appendix B, Table 6).

FIGURE 7

Enrollment in Specific Mathematics Courses, as Reported by Students, SREB Vocational Students, National Vocational Students, and National Academic Students

NATIONAL ASSESSMENT OF EDUCATIONAL PROGRESS RESULTS FOR 1988 SREB PILOT SITE VOCATIONAL COMPLETERS

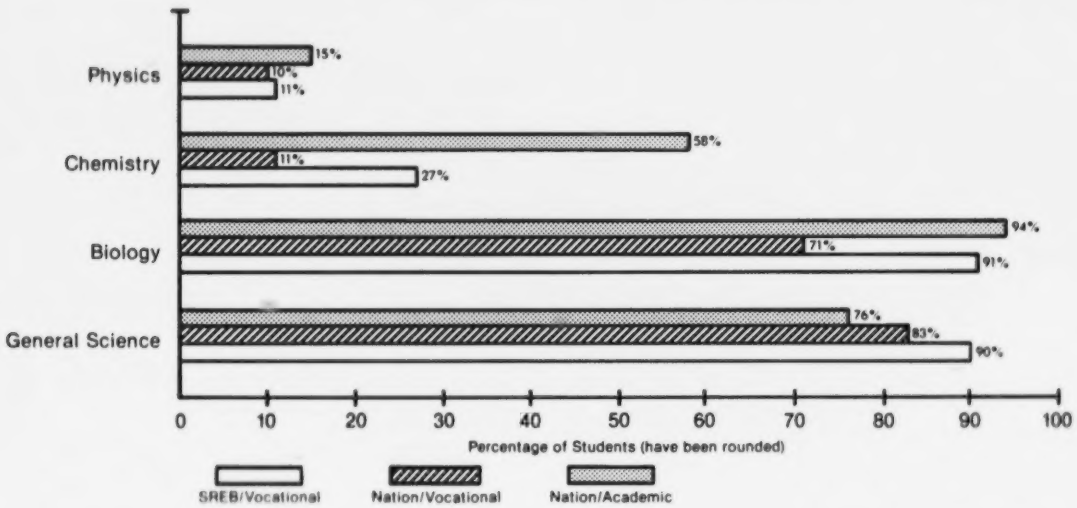


Similar results were found in student enrollment in science courses (Figure 8). More SREB site vocational completers reported having taken each type of science course than did vocational students nationally. However, only 27 percent and 11 percent of SREB site vocational completers reported completing courses in chemistry and physics. Compared to *all* students nationally, more SREB site vocational completers took general science and biology, but fewer took chemistry and physics (Appendix B, Table 7).

FIGURE 8

Enrollment in Specific Science Courses, as Reported by Students, SREB Vocational Completers, National Vocational Students, and National Academic Students

NATIONAL ASSESSMENT OF EDUCATIONAL PROGRESS RESULTS FOR 1988 SREB PILOT SITE VOCATIONAL COMPLETERS



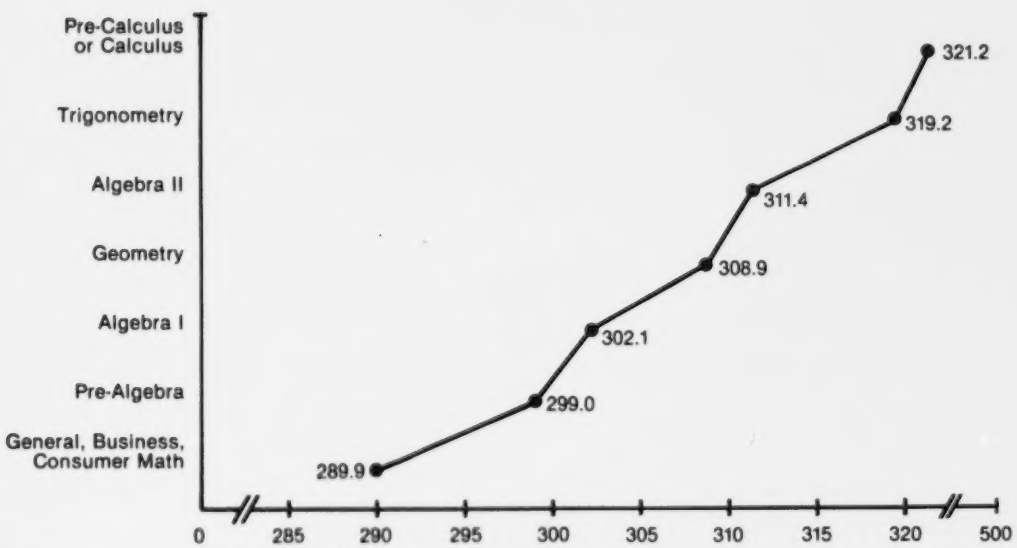
Not surprisingly, more SREB completers took general mathematics and science courses than did students nationwide who reported being in the academic curriculum; in the higher levels of mathematics and science courses, about two times as many academic students nationwide reported taking these courses than did SREB completers.

Because mathematics courses are taken sequentially -- more so than in English or science -- student achievement results can be tracked as students progress through the sequence of mathematics courses. As one would expect, the average mathematics achievement scores of SREB site vocational completers increased consistently as students indicated having completed higher levels of mathematics courses, from general mathematics through calculus (Figure 9). The NAEP data confirm the widely held belief that students who have not completed at least algebra I are at a clear disadvantage when compared to students who have completed this course (Appendix B, Table 6). As would also be expected, the average mathematics scores were higher at those pilot sites where students reported having taken more mathematics courses and where a higher percentage of vocational completers had taken higher-level mathematics courses.

FIGURE 9

Average Mathematics Scores of Students Who Have Completed Specific Mathematics Courses, SREB Vocational Completers

NATIONAL ASSESSMENT OF EDUCATIONAL PROGRESS RESULTS FOR 1988 SREB PILOT SITE VOCATIONAL COMPLETERS



Note: Appendix B, Table 6 contains additional data.

While the mathematics and science achievement scores of SREB pilot site vocational completers are related to the number of courses taken in these areas, average achievement scores were significantly higher for completers who reported completing courses other than those labeled "general." For example, a regression analysis* of the NAEP data showed that completers scored approximately 10 points higher on the mathematics portion of the NAEP each time they took another mathematics course. In terms of specific courses, the analysis revealed that taking a general mathematics course added less than 3 points, pre-algebra added 9 points, algebra I added 12 points, and geometry added 13 points.

The regression analysis revealed similar results for the relationship between the completion of science courses and average science achievement scores. SREB site vocational completers scored approximately 20 points higher in science for each additional science class. SREB completers taking science courses labeled "general science" showed the least gain, approximately 10 points, while students taking chemistry demonstrated the most gain, 27 points.

Each question on the NAEP has been classified according to the content of the question as well as the process (competencies) used to answer the question. The 90 mathematics questions were classified into seven content categories and five process areas. (These content and process categories are defined in Appendix B, Tables 8-9.) An analysis of the NAEP mathematics data by content classifications reveals that 50 percent or less of SREB site vocational completers provided correct responses in the content areas of discrete mathematics, measurement, and geometry. In terms of the processes students must use to answer the mathematics questions, SREB site vocational completers were weakest in the areas of problem-solving and reasoning, routine application, and understanding and comprehension. The area in which SREB completers scored closest to the nation (a difference of 7 percentage points) was in routine application -- using mathematical knowledge, skill, and

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*A regression analysis is a statistical procedure whereby all measurable factors are held constant except one. Thus, all factors -- such as race, gender, socioeconomic level, and other demographic variables -- were held constant so that comparisons could be made against the number of courses taken and then against the types of courses taken. To the extent possible, factors are included in the analysis to estimate variables that are not measured by the NAEP, such as, motivation and attitude.

understanding in solving problems. The gaps between SREB completers and the nation in the other process areas ranged from a difference of 11 to 16 percentage points.

The 67 science questions were classified into six content categories and three process areas. (The content categories are listed and the process areas are defined in Appendix B, Tables 10-11.) No more than half of the SREB site vocational completers correctly answered the questions in each content area. In answering the questions, the majority of SREB completers could recall scientific facts, but only about 40 percent were able to use and integrate scientific facts and principles.

It is important to note that science achievement for the nation as a whole is very poor, thus raising serious questions as to how and what students are learning in their science courses. The large gap between the science achievement of SREB site vocational completers and that of *all* 17-year-old public high school students nationwide suggests the need to reexamine the expectations, goals, content, and instructional methods used by science and vocational teachers for teaching science to students pursuing vocational studies, as well as the recommended sequence of science courses for vocational students.

Student Attendance

SREB vocational completers who missed three or more days of school the month previous to being tested had lower average achievement scores in reading, mathematics, and science than did students who missed two or fewer days (Appendix B, Table 12). Similar percentages of black and white SREB site vocational completers indicated that they were absent a certain number of days the previous month, but the scores of black students appear to be less affected by the number of absences than do the scores of white students. The largest percentage, 42 percent, of SREB site vocational completers missed one or two days of school in the previous month; almost one-fourth were absent three or four days and 11 percent were absent from five to ten days.

These results suggest that students generally do not learn if they are not in school. The NAEP data provide reasons for school leaders to establish attendance policies limiting the number of allowable unexcused absences each year. Such policies would set higher expectations for students and increase the amount of time they spend acquiring the knowledge and skills necessary for success.

Student Expectations and Attitudes

SREB site vocational completers who reported that their teachers and schools established a climate of encouragement and high expectations generally had higher reading, mathematics, and science scores than did SREB completers who reported that their schools and teachers did not expect a lot from them. For example, SREB site vocational completers who reported spending one hour or more on homework each day had higher average scores than those SREB completers who indicated that they usually do not have any homework assigned each day (Table 7). It is interesting to note that over one-third of SREB site vocational completers reported that they spent no time on homework each day either because none was assigned or because they did not do the homework that was assigned to them.

TABLE 7

Amount of Time Spent on Homework Each Day,
as Reported by Students,
and Corresponding Average Scores,
SREB Vocational Completers

NATIONAL ASSESSMENT OF EDUCATIONAL PROGRESS RESULTS
FOR 1988 SREB PILOT SITE VOCATIONAL COMPLETERS

	Percent of SREB/Vocational	Average Scores		
		Reading	Mathematics	Science
None Assigned	26%	52.0	289.0	262.1
1 Hour or More*	42%	55.1	294.7	270.0

*Represents data that has been collapsed from three possible responses. The percentages were combined and a weighted average score was calculated.

Notes: Percentages have been rounded.

Percentages do not add to 100 because other responses were available. Appendix B, Table 13 contains a complete listing of data for each of the six possible responses.

SREB site vocational completers who reported that they were encouraged to take and allowed to enroll in more difficult mathematics and science courses, and that their teachers expected and encouraged them to do well in school had significantly higher reading, mathematics, and science scores than those SREB completers indicating that they were not encouraged to do these things (Appendix B, Table 13).

It seems that students would expect more of themselves if they could repeat high school. When asked what *one* thing they would do if they could go through high school again, about 45 percent indicated they would study more and a total of 35 percent of the SREB site vocational completers reported that they would choose different courses to include higher-level mathematics and science courses that would compliment their vocational studies and better prepare them for college. Over 20 percent of the SREB completers responded that they would not do anything differently (Appendix B, Table 14).

An overwhelming majority of SREB site vocational completers felt that the education they had received in high school had adequately prepared them for life after graduation (Appendix B, Table 15). Over 90 percent indicated that high school had prepared them to read, understand, and apply technical information on the job; identify and solve problems; and correctly complete a job application. Almost 75 percent reported that high school had prepared them to enter and succeed in technical school, while 69 percent indicated they were prepared to enter and succeed in college. In most cases, NAEP achievement scores were consistent with student responses. For example, SREB completers who reported that they were not prepared to use technical materials, write a business letter, or complete a job application had significantly lower reading scores than those who indicated that they were prepared to complete such tasks.

Assistance in Planning a Four-Year Program of Study

Over one-third of the SREB site vocational completers reported that they received the most help in planning their high school program of study in grade 10 or 11; almost 20 percent indicated that they never received any help (Appendix B, Table 16). Over half of the SREB site vocational completers reported that a guidance counselor never helped them to develop a four-year educational plan for high school. SREB completers mostly sought advice from their mothers and their friends when deciding what courses to take in high school; only about 20 percent said that they talked a great deal with their guidance counselor or teachers (Appendix B, Table 17).

These and other data from the student survey portion of the NAEP lend credence to the widely held belief that students pursuing vocational studies are not provided the assistance they need -- early enough in their high school career -- to plan a coherent and challenging program of vocational and academic study that will help them to achieve their employment and educational goals.

The achievement scores of students who seek assistance -- whether from parents, friends, counselors, or teachers -- in planning their coursework tend to be higher than the scores of students who get no help. However, the fact that students who do receive help specifically from counselors in planning their high school coursework score no better than those who do not receive such assistance begs several questions: Are counselors knowledgeable of the vocational and academic courses that should be suggested for the various vocational areas? Are counselors (and teachers, as well) steering vocational students into general academic courses rather than the higher-level mathematics and science courses that will further enhance students' vocational coursework? Why are more parents not involved in the process of planning and updating their children's high school program of study?

Future Plans of SREB Pilot Site Vocational Completers

Almost half of the SREB site vocational completers reported that they planned to pursue further education or vocational training after high school -- 28 percent planned to take academic coursework; the remaining 19 percent would pursue vocational training either on the job or in a postsecondary institution (Table 8). The achievement scores of those SREB completers intending to pursue academic studies were significantly higher than the scores of those with other plans, yet remained well below the average scores for students nationally who indicated they were in the college preparatory curriculum (59.1 in reading, 317.7 in mathematics, and 308.1 in science). This significant difference raises serious questions about whether vocational students are adequately prepared to enter college-level, degree-credit courses upon graduating from high school. Almost 40 percent of the SREB completers indicated that they intended to work full-time, while 8 percent planned to enter the military.

TABLE 8

What Will Take the Largest Amount of
Students' Time After High School
and Corresponding Average Scores,
SREB Vocational Completers

NATIONAL ASSESSMENT OF EDUCATIONAL PROGRESS RESULTS
FOR 1988 SREB PILOT SITE VOCATIONAL COMPLETERS

			Postsecondary Education/Training*		
	Full-Time Work	Military	Academic Coursework at a Two- or Four-Year College	Vocational Coursework On the Job or at a Postsecondary Institution	Other^
Percent of SREB/Vocational	38%	8%	28%	19%	7%
Average Scores					
Reading	51.7	51.7	57.5	54.1	51.6
Mathematics	286.2	290.1	307.4	291.6	285.0
Science	258.1	263.1	285.3	268.9	257.3

Note: Percentages have been rounded.

*Each column represents data that has been collapsed from two possible responses. The percentages were combined and a weighted average score was calculated.

^Represents data that has been collapsed from the following responses: "Being a full-time homemaker;" "Working part time, but not attending school;" and "Other (travel, take a break, no plans). The percentages were combined and a weighted average score was calculated.

The reported post-high school plans for SREB site vocational completers differed greatly among the different vocational fields (Appendix B, Table 18). The majority of completers in agricultural and trade/industrial occupations programs planned to work full time. Almost half of the marketing completers and about one-third of the business/office, health occupations, and technical education/industrial arts SREB completers responded that they would pursue academic studies at a two- or four-year institution. About one-fourth of the SREB completers in health occupations and technical programs indicated that they planned to take vocational coursework either through an on-the-job training program or in a postsecondary institution.

STRATEGIES TO IMPROVE THE READING, MATHEMATICS, AND SCIENCE ACHIEVEMENT OF SREB PILOT SITE VOCATIONAL COMPLETERS

The goal of the SREB-State Vocational Education Consortium over the next five years is to close by one-third the gap in the reading, mathematics, and science achievement between SREB site vocational completers and students participating in the 1986 National Assessment who indicated they were enrolled in the college preparatory curriculum, as measured by the National Assessment of Educational Progress. Because almost half of the 1988 SREB site vocational completers reported that they planned to pursue some form of postsecondary education -- about one-fifth in a four-year institution -- the Consortium's five-year goal will help to ensure that students graduating from vocational programs possess the academic and technical skills necessary for success in a postsecondary institution. At the same time, those vocational completers who do not plan to continue their education after graduation will be better equipped to find employment in their field of concentration, continue to learn on the job, and return at a later date to enter some type of postsecondary education.

Strategies to improve the basic competencies of vocational education completers at the SREB pilot sites have generally been focused in three areas: staff development and in-service activities for vocational and academic teachers, counselors, and administrators; matching the skills and competencies common to both the vocational and academic curricula; and the development of a coherent, sequential program of vocational and academic study for each vocational concentration. The following will offer recommendations specific to the improvement of reading, mathematics, and science achievement as well as a discussion of the importance of developing a program of vocational and academic study.

Strategies for Improving Reading Achievement

Attention to higher-level reading skills has begun at several of the SREB pilot sites. The sites that have been most successful in raising the reading skills of vocational students are those that have moved away from "packaged" reading programs that concentrate on isolated skills and instead provide students with reading

experiences using a wide range of challenging materials that are directly related to their vocational and academic studies. The more successful efforts no longer allow watered-down textbooks; rather, students are assisted through the development of comprehensive strategies that will ultimately lead to students mastering more complicated materials.

One example of a successful program is the effort at the Consortium pilot site in Randolph County, West Virginia. Leaders at that site have provided both vocational and academic teachers with extensive in-service activities designed to demonstrate how reading can be taught through the vocational and academic curricula. Teachers were assisted to develop the teaching skills necessary to help students interpret and elaborate on ideas gained from their classroom reading materials. In addition, for several years faculty at the Randolph County site have assigned homework requiring vocational students to develop outlines on technical reading materials related to their vocational studies. Vocational teachers have developed strategies to ensure that the assignments are completed and the outlined information is incorporated into the activities undertaken in the vocational laboratory.

To improve the reading achievement of vocational completers, the following strategies are recommended:

- Staff development and in-service activities should provide vocational and academic teachers with instructional methods they can implement in their courses that will advance the reading, writing, and critical-thinking skills of vocational students.

- Instruction in remedial reading should be based on the textbooks and other related materials that students must master in their vocational and academic courses, not on watered-down materials that are unrelated to students' coursework.

- Team teaching strategies should be developed among remedial reading, English, and vocational teachers to encourage the coordination of instruction.

- Federal vocational funds should be used to provide extra reading instruction to help at-risk students master the reading materials necessary for success in vocational and related academic courses.

- Vocational and academic teachers should be provided extra planning time to develop instructional strategies for advancing students' ability to read, comprehend, and use technical materials related to their vocational field of study.

Strategies for Improving Mathematics Achievement

Strategies that encourage students pursuing vocational studies to enroll in higher-level mathematics courses rather than those labeled "general" and that require students to apply mathematics skills and concepts to solve real-world problems in both vocational and academic courses have been implemented at several of the SREB pilot sites. Those sites demonstrating these approaches generally had higher mathematics scores on the National Assessment of Educational Progress than those sites where such practices were not evident.

Based on the data from several questions on the student survey portion of the NAEP, SREB site vocational completers spend most of their time in mathematics courses watching the teacher work problems at the chalkboard, and then completing paper and pencil drills to practice in a rote manner what they have just seen the teacher do. More innovative forms of instruction are needed, such as group activities, laboratory exercises that link the application of mathematics concepts and skills to solving real-world problems in a broad range of jobs, and hands-on instructional activities. The NAEP data indicates that few SREB site vocational completers are taught how and allowed to use calculators and computers to perform the mechanical functions of mathematics; yet in our technology-oriented workplace, these are the tools of modern workers. Mathematics instruction for vocational completers appears to emphasize the *repetition* of rote mechanical skills over the actual *understanding* of mathematical concepts.

To improve the mathematics achievement of vocational completers, the following strategies are recommended:

- Increased emphasis should be given to incorporating applied and functional context instruction in all mathematics courses in grades 7-12.

- The content of mathematics instruction in grades 7 and 8 for potential vocational students should be reviewed and improved.

- A sequence of three mathematics courses should be required for vocational concentrators who are not concurrently enrolled in the college preparatory curriculum. One possible sequence of mathematics courses would be:
  - Grade 9 -- pre-algebra, applied technical mathematics, or algebra I
  - Grade 10 and/or 11 -- applied technical mathematics, algebra I, or geometry
  - Grade 11 and/or 12 -- geometry or algebra II

- Improve and increase the amount of instructional time in mathematics and vocational courses devoted to skills in which 1988 SREB site vocational completers were weakest on the National Assessment: measurement; geometry; computation of fractions, decimals, and percentages; and problems involving negative numbers.

- Provide staff development and in-service activities for vocational teachers on mathematics content, the language of mathematics, and instructional methods for integrating and reinforcing mathematics concepts and skills in the context of the vocational courses they teach.

- Provide staff development and in-service activities for mathematics teachers on applied teaching techniques, the use of mathematics in vocational courses, and instructional methods for integrating applied teaching strategies into the mathematics curriculum.

- Require that vocational and mathematics teachers meet regularly for the purpose of working together to revise their curricula; developing instructional strategies for integrating mathematics into the vocational curriculum and applied teaching techniques into the mathematics curriculum; and increasing the communication and coordination of activities between mathematics and vocational teachers.

- Provide at-risk students with extra instructional help in mathematics.

- Require all vocational students to be competent in the proper use of calculators and computers to solve mathematical problems.

- Require vocational completers considering postsecondary study to enroll in a mathematics course in grade 12.

Strategies for Improving Science Achievement

Based on the below-average science scores for SREB site vocational completers, it is likely that few, if any, of the SREB pilot sites have initiated strategies to improve the quality of science instruction for vocational completers. Student responses to NAEP items indicate that science instruction predominately focuses on listening to lectures, reading textbooks, and performing workbook exercises. Few science courses afford students the opportunity to engage in laboratory and hands-on activities to explore general science concepts or to link specific science concepts and skills to their vocational classes.

For the majority of science courses, most science teachers believe that laboratory-based classes are most effective. However, the primary technique for teaching science to vocational students continues to be the lecture format. The desirability of lab-based science courses over textbook-based courses seems to be confirmed by the NAEP data. For example, at one SREB pilot site, all vocational completers are required to complete two lab-based science courses -- one in physical science; the other in life science. The average NAEP science score for vocational completers at this site was about 18 points higher than the average for the SREB-State Vocational Education Consortium, a significant difference.

The NAEP science data indicates -- both for the SREB Consortium and for the entire nation -- that what has traditionally been taught in science may not be sufficient or appropriate for students pursuing vocational studies. It appears that little attention has been given to the content and sequence of science instruction needed by vocational completers in the various vocational concentrations or to strategies for improving science instruction in both academic and vocational courses. As a result, increasing numbers of young Americans leave school without the skills and knowledge in science and technology necessary to succeed in an increasingly technological workplace and society.

To improve the science achievement of vocational completers, the following strategies are recommended:

- Science curriculum and instruction in grades 7 and 8 should include laboratory and hands-on experiences.

- A coherent, lab-based sequence of science courses should be identified for each vocational concentration for those vocational completers who are not taking the college preparatory sequence of science courses. One possible sequence would be:
  - Grade 9 -- a lab-based physical science course
  - Grade 10 -- a lab-based biology or life science course
  - Grade 11 and/or 12 -- speciality science courses linked to students' vocational studies; for example, principles of technology, applied chemistry, applied biology, computer science, medical laboratory, physiology, botany, food science, etc.

- Vocational students should be required to complete science courses that incorporate laboratory experiences.

- Science teachers should be provided staff development on applied teaching techniques that will help them link science concepts to students' vocational studies.

- Vocational teachers should be provided staff development on incorporating related science content into their vocational instruction.

Developing a Vocational and Academic Program of Study to Improve Course Selection and Planning

On the student survey section of the NAEP, SREB site vocational completers were asked if they received assistance from their guidance counselor in developing a four-year educational plan. About half of the completers indicated that they had received help from their counselor, yet their scores on each of the three subject areas tested were not significantly higher than the scores of those students who had not received similar help. These results raise some serious questions about the assistance vocational students receive when planning their high school education: Are vocational students encouraged to take higher-level academic courses that will compliment their vocational interests? Or are they steered into lower-level "general" courses that do not have high expectations for student achievement? Are guidance counselors aware of the sequence of vocational and academic courses *for each vocational concentration* that will provide students the foundation of knowledge and skills necessary to continue to learn on the job or in a postsecondary institution?

Little attention has been given to role of school guidance counselors in improving students' basic competencies by assisting them to pursue a coherent and challenging program of vocational and academic studies. Evidence from national studies suggests that improving course selection offers the single greatest potential for improving the basic competency achievement of students. Every guidance counselor knows exactly which academic courses students should take if they plan to go on to college. However, very few counselors can list both the vocational and academic courses students should complete if they want to pursue a technical career as, for example, an electronics technician. Few schools have given serious thought to creating a process whereby assistance is provided to all students considering vocational studies to plan a coherent and challenging program of vocational and academic courses designed to provide them the knowledge and skills necessary to succeed in both an employment and postsecondary education setting.

By becoming involved and providing course selection advisement to students, school counselors can have an enormous influence on students' basic competency achievement levels. Students need help -- especially in grades 8, 9, and 10 -- to plan a program of study that enables them to see the connection between their vocational interests and the academic courses they choose to take. Students need assistance in making "considered choices of courses" in light of preparing for both employment and further education. To assist school counselors with the task of advising students on course selection, vocational and academic teachers need to prepare a recommended "program of vocational and academic study" for each vocational concentration, a program which outlines the vocational and academic courses students should take to enhance their opportunities for success in the workplace and in a postsecondary institution.

To assist students in selecting a coherent and rigorous sequence of vocational and academic courses, the following strategies are recommended:

- Teams of vocational and academic teachers, administrators, counselors, and representatives from business and industry and postsecondary education should meet to determine the levels of knowledge and skills necessary for success in each vocational concentration. Based on those determinations, a coherent and sequential program of vocational and academic study should be specified for each vocational concentration.

- Staff development should be provided for teachers and counselors to inform them of the purpose and advantages of the program of study initiative, and to demonstrate how they can assist and encourage students to select challenging courses.

- Beginning in grade eight, students should receive on an annual basis educational, career, and assessment information to assist them in planning a four-year educational plan. Students and their parents should meet with a guidance counselor annually to review the four-year plan and to update the plan as students begin to refine their interests and goals.

- Students should be encouraged to see the connection between completing a vocational concentration and opportunities for further study beyond high school.

APPENDIX A

SREB-State Vocational Education Consortium Pilot Sites

State	City/County	Site
Alabama	Evergreen*	Conecuh County Area Vocational Center
	Jefferson County	Minor High School
	Muscle Shoals	Muscle Shoals High School and Area Vocational Center
	Phenix City*	Phenix City Area Vocational Center
Arkansas**	**Jonesboro**	**Jonesboro Area Vo-Tech High School**
Florida	Hillsborough County	Leto Comprehensive High School
	Orange County*	Apopka Senior High School
	Palm Beach County	Palm Beach Gardens Senior High School
	Polk County	Lake Gibson Senior High School
Georgia	**Gwinnett County**	**Meadowcreek High School, Oakland Vocational Center, Parkview Vocational Center**
	Polk County	**Cedartown Comprehensive High School**
Kentucky	Jefferson County	Fairdale High School
	Trigg County	Trigg County High School

*Did not participate in 1988 National Assessment Education Progress testing.

**Arkansas River Technical School in Arkansas, and Avery County and Weldon City High Schools in North Carolina are included in the NAEP data but are no longer participating as Consortium pilot sites.

APPENDIX A
(continued)

State	City/County	Site
Louisiana	**Lafayette***	**Carencro High School and Lafayette Parish Career Center**
	Shreveport*	**Woodlawn High School and Caddo Career Center**
Maryland	Frederick County	Frederick Vo-Tech Center
	St. Mary's County	St. Mary's Tech Center
Mississippi	**Gulfport**	**Gulfport High School and Vocational Center**
	Pontotoc	**Pontotoc Ridge Area Vocational Center**
North Carolina**	Charlotte	Myers Park Senior High School
	Raeford	Hoke High School
	Snow Hill	Greene Central High School
	Swain County	Swain County High School
Oklahoma	**Duncan**	**Red River Area Vo-Tech School**
	Woodward	**High Plains Area Vo-Tech School**
South Carolina	Cherokee County	Cherokee Area Vocational Center, Gaffney and Blacksburg High Schools
	Oconee County	Fred P. Hamilton Career Center and four district high schools

*Did not participate in 1988 National Assessment Education Progress testing.

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APPENDIX A
(continued)

State	City/County	Site
Tennessee	**Claiborne County**	**Claiborne County High School and Vocational Center**
	Hickman County*	**Hickman County High School and Vocational Center**
	Humphreys County	**Humphreys County High School and Vocational Center**
	Memphis	**Trezevant Vocational Center**
Virginia	Norfolk City	Norview High School
	Rockbridge County	Rockbridge High School
	York County	York High School
West Virginia	**Clarksburg**	**United Career Center and several high schools**
	Randolph County	**Randolph County Vocational-Technical Center and several high schools**
	Wheeling	**Wheeling Park High School**

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